Oct. 12, 1937. K. E. DUDLEY 2,095,359

AUTOMATIC PUNCH FOR PRINTING PRESSES

Filed Nov. 25, 1935

Fig. 1.

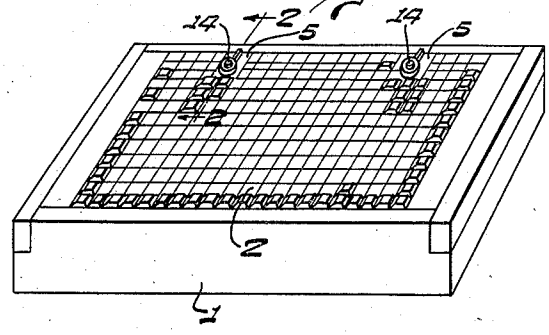


Fig. 2.

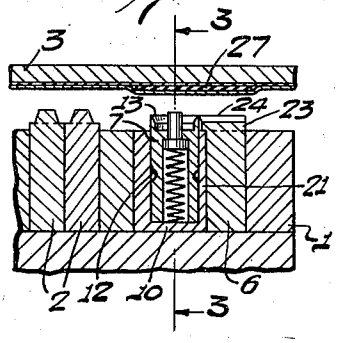


Fig. 3.

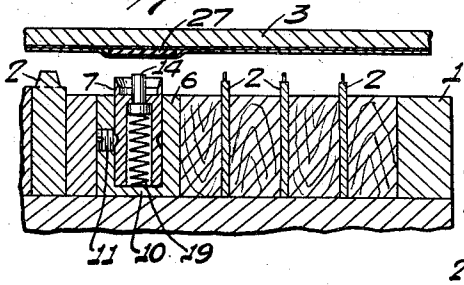


Fig. 4.

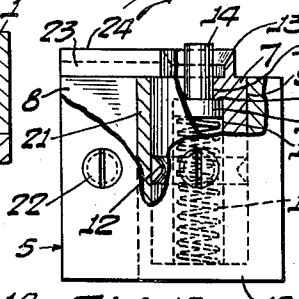


Fig. 5.

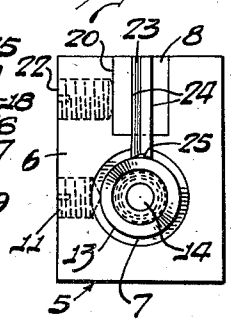


Fig. 12.

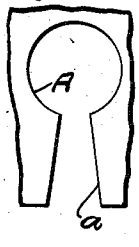


Fig. 13.

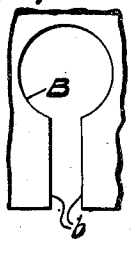


Fig. 14.

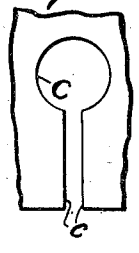


Fig. 15.

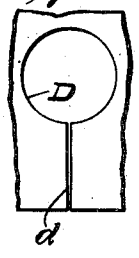


Fig. 7.

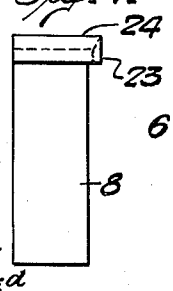


Fig. 6.

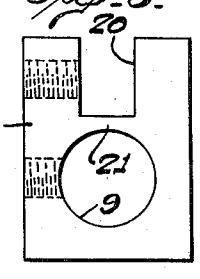


Fig. 8.

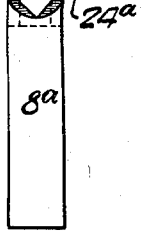


Fig. 9.

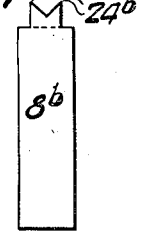


Fig. 10.

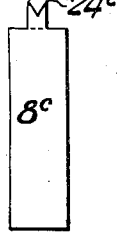
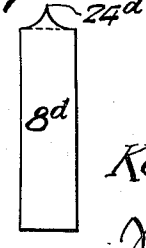


Fig. 11.



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UNITED STATES PATENT OFFICE

2,095,359

AUTOMATIC PUNCH FOR PRINTING PRESSES

Kenneth E. Dudley, Hagerstown, Md.

Application November 25, 1935, Serial No. 51,504

4 Claims. (Cl. 164—85)

The present invention relates to improvements in punches or cutters and more especially to punches or cutters adapted to punch or cut sheets of paper, cards and the like to enable them to be employed in loose leaf binders, files and the like, automatically in a printing press simultaneously with the printing of ruled lines or other printed matter thereon.

One of the primary objects of the invention is to provide a punch which is adapted to be set up in the printing form with rules, type or other printing elements and embodying a member or portion which is operative to punch or cut a hole in the sheet, card or the like adjacent to an edge thereof, and a cooperative punch or cutting member which is operative to simultaneously punch or cut a slot or slit extending from the hole to the adjacent edge of the sheet, card or the like.

Another object of the invention is to provide a punch holder which is adapted to accommodate interchangeably punches or cutters for punching holes of different sizes.

A further object of the invention is to provide a punch holder which is adapted to accommodate interchangeably punches or blades for punching or cutting slots of different widths or shapes or slots or slits of different lengths to conform with the sizes of the punched holes.

To these and other ends the invention consists in certain improvements and combinations and arrangements of parts all as will be hereinafter more fully described, the features of novelty being pointed out particularly in the claims at the end of this specification.

In the accompanying drawing:

Figure 1 is a perspective view of a printing form having punches or cutters embodying the present invention set up therein;

Figure 2 is a transverse section on an enlarged scale, taken through the form shown in Fig. 1 on the line 2—2 in said figure and showing a portion of the cooperative platen of a printing press;

Figure 3 is a detail sectional view, taken on the line 3—3 in Fig. 2;

Figure 4 is an elevation partly in section, on a further enlarged scale, of one of the complete punches;

Figure 5 is a top plan view of the punch or cutter shown in Fig. 4;

Figure 6 is a view similar to Fig. 5, showing the punch block with the punching or cutting elements removed therefrom;

Figure 7 is an elevation of one of the slotting or slitting punches or blades;

Figures 8, 9, 10, and 11 are edge elevations of slotting or slitting punches or cutting members for producing slots or slits of different widths and shapes; and

Figures 12, 13, 14, and 15 show portions of sheets slotted or slitted by the punches or blades shown in Figs. 8 to 11 inclusive.

Similar parts are designated by the same reference characters in the different figures.

The present invention provides relatively simple and effective means for automatically punching or cutting holes or perforations in sheets, cards or the like at any desired position or positions on the sheet, in an ordinary printing press at the same time the sheets, cards or the like are printed with ruled lines or other desired printed matter, so that such sheets, cards or the like may be inserted as pages in loose leaf binders, books, files and the like, which is not feasible with any punching machine heretofore known. The present invention enables the punches or cutters to be readily adapted to punch or cut holes of different sizes and of any desired shapes, and when the holes are punched near an edge of the sheet, to punch or cut slots of different sizes or shapes leading from the holes to the adjacent edge of the sheet, card or the like or merely to cut slits from the holes to the adjacent edge of the sheet, card or the like, and the punches or cutters may be readily set up in the same printing form which contains rules, type or other printing elements for printing the sheets, cards or the like. The preferred embodiment of the invention is shown in the accompanying drawing and will be hereinafter described in detail, but it is to be understood that the invention is not restricted to the precise construction shown since equivalent constructions are contemplated and such will be included within the scope of the claims.

Referring to the drawing 1 represents an ordinary chase such as commonly used in printing presses, especially those of the job press type, to hold a printing form 2 which may be made up of printing rules, type or other desired printing elements, such rules, type or printing elements being preferably of the usual standard type height. 3 represents the platen of an ordinary printing press of the job press type which, as well known, serves to press the sheet, card or the like to be printed against the printing rolls, type or other printing elements composing the printing form.

According to the present invention, punches 5

are set up in the printing form along a margin thereof, these punches being of such height as to punch the sheets, cards or the like at the same time the printed impressions are made thereon in the press. In the present instance, two of these punches are set up in the form so that the sheets, cards or the like will be punched along their margins at points to conform with the pins, wires or the like of loose leaf binders or files.

Each punch, according to the present invention, comprises a block 6 which is preferably rectangular in horizontal cross-section to adapt it to be set up in the form with various kinds of printing rules, type and other printing elements such as commonly used in printing, and the bottom of the block is preferably flat and lies in a plane at right angles to the sides of the block to form a foot on which the block may rest when the same is set up in the form, thus gauging the height of the punch in the form. Each punch block provides a holder for a hole perforating punch 7 and a slot forming or slitting punch 8. The block is provided for this purpose with a bore 9 of suitable shape, preferably cylindrical, which extends from the top of the block to a point near the bottom thereof, leaving a wall 10 which closes the bottom of this bore, and the punch 7 which is preferably cylindrical in form, is fitted removably in the bore 9, its lower end bearing on the bottom wall 10 so that the latter provides a solid support for the punch. The punch may be removably secured in the block by a set screw 11 threaded into a side of the block and having a tapered inner end to engage in a V-shaped groove 12 which extends circumferentially around the punch 7 at the proper height. The upper end of the punch 7 is formed with a sharp cutting edge 13 of suitable shape, it being circular in the present instance to adapt it to the punching of circular holes in the sheets, cards or the like. The punch is provided with an ejector for automatically removing the punchings from the punch after each punching operation, this ejector comprising a plunger 14 which is fitted to reciprocate axially through a bore 15 formed in the punch 7 below the cutting edge 13 thereof, the lower end of this plunger having a flange or shoulder 16 thereon which is movable axially in a bore 17 formed within the punch 7 and which is larger than the bore 15 therein so that a shoulder 18 is provided within the body of the punch against which the flange 16 may abut and thereby limit the outward movement of the plunger. A compression spring 19 is contained in the bore 17, one end thereof resting against the bottom wall 10 of the block 6 and the other end of the spring bearing against the flange 16, this spring holding the flange 16 yieldingly against the shoulder 18 and the outer end of the plunger 14 slightly higher than or above the level of the cutting edge 13 as shown in Fig. 4 but permitting the plunger to be depressed during each punching operation. A number of the punches 7 having cutting edges 13 of different diameters for the punching of holes of different sizes are employed, but each of these punches has a body of the same diameter and shape so that the different punches will fit interchangeably in the bore 9 of the block 6. For example, in Fig. 2, the annular cutting edge 13 is of the full outside diameter of the body portion of the punch 7 and in Fig. 4, the annular cutting edge 13 is of a relatively smaller diameter, so that these punches are adapted to punch holes of different sizes.

The punch block 6 also has a slot 20 formed in one side thereof, said slot extending from top to bottom, to receive a slotting punch or cutting blade block 8. The slot 20 preferably does not intersect the bore 9 in the block, so that an intervening wall 21 is left between the bore 9 and slot 20 which will effectively prevent spreading of the sides of the block adjacent to the slot 20, the punch 8 being removably secured in the block by a set screw 22 which is threaded into one side thereof and clamps the punch 8 when tightened. The punch 8 has a shank portion which is preferably rectangular in cross section and of a size to fit closely but removably in the slot 20, and this punch has a head 23 on its upper end which is provided with a V-shaped groove to form cutting edges 24 adapted to punch slots in the sheet, card or the like. The head 23 carrying these cutting edges extends beyond or overhangs the shank of the punch so that it will extend over the upper end of the dividing wall 21 between the slot 20 and bore 9 and fit closely at its end against the side of the cutting edge 13 of the punch 7, this end of the head 23 being preferably formed with a V-shaped notch or groove 25 therein to provide a close fit thereof against the side of the cutting edge 13. A number of punches or blades 8 the heads 23 of which overhang to different extents are provided to interchangeably fit in the slot 20 in the block to cooperate with hole cutting punches having cutting edges of different diameters, as will be understood for example from Figs. 2 and 4, and a number of blades 8 may be provided having cutting edges of different lengths for punching or cutting slots or slits of different lengths to extend from the holes in the sheets to the adjacent edge thereof, as may be desired.

The setting of the lower end of the body of the punch 7 on the bottom wall 10 of the punch block definitely gauges the height of the cutting edge 13, and the setting of the extension of the head 23 on the upper end of the wall 21 gauges the height of the cutting edges 24 so that the cutting edges 13 and 24 will be accurately alined in the same plane, and the engagement of the inner vertical edge of the shank of the punch 8 against the wall 21 serves to accurately aline the cutting edges 24 with the cutting edge 13, so that the cutting edges of the punches 7 and 8 will all lie in the same plane for effective punching action.

A number of punches 8 having cutting edges thereon arranged for punching or cutting the slots of different widths or shapes are provided, these punches however having body portions or shanks of the same size and shape so that they may be interchangeably fitted into the slot 20 of the punch block. For example, Fig. 8 shows a punch 8^a having convergently arranged cutting edges 24^a thereon for punching a dove-tailed or tapered slot *a* in the sheet, card or the like as shown in Fig. 12; Fig. 9 shows a punch 8^b having parallel cutting edges 24^b for punching a parallel sided slot *b* in the sheet, card or the like as shown in Fig. 13; Fig. 10 shows a punch 8^c having more closely spaced cutting edges 24^c for cutting or punching a relatively narrower parallel sided slot *c* in the sheet, card or the like as shown in Fig. 14; and Fig. 11 shows a punch 8^d having a single cutting edge 24^d for cutting or punching a slit *d* in the sheet, card or the like as shown in Fig. 15. The slot or slit thus cut or punched will extend into or join the hole A, B, C or D punched in the sheet, card or the like by the punch 7, and as previously stated, these holes may be punched in

different sizes by employing punches 7 having cutting edges 13 of different diameters.

In using punches according to the present invention, the punch blocks 6, having the desired punches 7 and 8 mounted therein, are assembled in the printing form with the printing rules, type or other printing elements and locked up therewith in the chase, the lower ends of the punch blocks providing feet on which these blocks may rest when the form is made up, thus insuring the location of the punches at the proper height relatively to that of the printing elements, and the punches will be located in the form in the proper positions according to the positions in which the holes or slots or slits are to be formed in the sheets, cards or the like. The cutting edges 13 and 24 of the punch elements are slightly less than standard type height, so that these edges will be lower than the printing surface of the form 2 and will not be engaged by the inking rollers as commonly used in presses and hence these cutting edges will not damage the inking rollers, and the platen 3 of the press has an offset plate 27 of lead or other relatively soft or yielding material mounted on the face thereof in positions opposite to the punches, to compensate for the reduced height of the cutting edges 13 and 24 and to provide an effective support against which these cutting edges may act to punch or cut the sheet, card or the like. The form mounted as usual in the press and containing the punches will print lines, reading matter or the like on the sheets, cards or the like and simultaneously with the printing operation the punches will punch the holes and punch or cut the slots or slits leading therefrom to the adjacent edges of the sheets, cards or the like. During each punching operation the exposed ends of the ejector plungers 14 which project above or beyond the cutting edge 13 will be depressed or forced back against the action of the spring 19 by engagement with the sheet, card or the like to permit the punching operation to be performed, but when the platen recedes, following each punching and printing operation, the plunger will be restored to its normal projected position, thereby ejecting the punching from the sheet, card or the like, thereby preventing clogging of the punch.

The present invention provides punching and slotting or slitting means which is capable of automatically punching holes and slots or slits in sheets of paper of various thicknesses, cards and the like simultaneously with the printing thereof, and as hereinbefore explained, it enables holes of various sizes and/or designs and slots or slits of various sizes and shapes to be punched. Since the punches constitute elements which may be assembled in any desired arrangement in the type form with the printing elements, the punches may be located to punch the holes and slots at any desired points in the sheets or cards and to punch sheets or cards of different sizes.

I claim as my invention:—

1. The combination of a printing press chase and a punch comprising a rectangular block set up in said chase with printing elements and having a bore therein and a slot extending parallel thereto, a wall extending parallel to and separating said bore and slot, a hole punching element fitted in said bore and a slotting blade separate from the punching element and removably fitted in said slot, said slotting blade having a portion overlying said separating wall and abutting against the operative end of the hole punching element.

2. A punch of the character described comprising a block having a bore, a punch element having a bore extending upwardly therein from its lower end and having a hole punching cutting edge at its upper end, a slitting blade removably carried by the block, said blade having a laterally extending head resting on said punch element to dispose the said cutting edge and slitting edge of the head in the same plane, an ejector extending from the bore in the punch element axially of the cutting edge and projecting beyond the plane thereof, and a spring contained in the bore of the punch element and resting at one end against said bottom wall and bearing at its other end against the ejector.

3. A punch for use in printing presses comprising a block adapted to be set up in a form with printing elements and having a bore extending from the top thereof and terminating short of the bottom thereof and forming a bottom wall, said block also having a slot in a side thereof adjacent to said bore, a wall separating said bore and slot, a hole-punching element fitted in said bore and bearing at its lower end on said bottom wall and having a cutting edge on its upper end, a slotting or slitting blade fitted in said slot in the block and having a head having a cutting edge on its upper side a portion of said head overlying the top of said separating wall and abutting against a side of the cutting edge on the hole punching element, and means for securing said hole punching element and blade in the block with their cutting edges lying in a common plane.

4. The combination of a printing press chase and a punch comprising a rectangular block set up in said chase with printing elements and having a bore therein to receive interchangeably punch elements of uniform diameter but having cutting portions of different diameters for punching holes of different sizes, and having a slot therein parallel to said bore forming a wall extending parallel to and separating said slot from said bore to interchangeably receive slotting blades of uniform thickness but having cutting portions of different dimensions to rest on said separating wall and abut against a side of the cutting portion of a hole punching element in said bore, and means for individually and removably securing a hole punching element in said bore and a slotting blade in said slot for removal of each independently of the other.

KENNETH E. DUDLEY.